

# ***X-linked Hydrocephalus (Bickers-Adams Syndrome) in a Nigerian Family***

EO Iroha\*, MTC Egri-Okwaji\*

## **Summary**

**Iroha EO, Egri-Okwaji MTC. X-linked Hydrocephalus (Bickers-Adams Syndrome) in a Nigerian Family.** *Nigerian Journal of Paediatrics* 2001; 28:78. A male infant with isolated prenatal hydrocephalus whose clinical features and family history were consistent with the diagnosis of X-linked hydrocephalus (Bickers-Adams syndrome) is described. Clinical, serological and radiological evidence for other causes of congenital hydrocephalus were lacking in the infant. Since the identification of an X-linked hydrocephalus has important consequences for genetic counselling, analysis of the family history of any male infant with isolated hydrocephalus is very important.

## **Introduction**

THE syndrome of X-linked hydrocephalus was first described in 1949 by Adams and Bickers following their findings in a newborn hydrocephalic male infant whose older brothers and four male maternal uncles were hydrocephalic at birth.<sup>1</sup> Subsequently, several case reports have been published.<sup>2-4</sup> The syndrome is rare, and accounts for two per cent of all cases of uncomplicated hydrocephalus. It is characterised by prenatal hydrocephalus secondary to aqueductal stenosis. Other features include spasticity, mental retardation, speech defect, seizure disorder, nystagmus, squint and visual impairment, all of which appear to be due to the effects of increased intracranial pressure and damage to the cerebral cortex and corticospinal tract. The recognition of this syndrome has important implications for the genetic counselling of the family so identified. We therefore, report the case of a Nigerian family with three consecutive hydrocephalic male infants whose clinical and family history are consistent with the diagnosis of a syndrome of X-linked hydrocephalus, in order to highlight the salient features and provide information that may guide physicians in the recognition of the syndrome.

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**Lagos University Teaching Hospital, Lagos**

**Department of Paediatrics**

\*Senior Lecturer

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**Correspondence: EO Iroha**

## **Case Report**

Baby AB was born at term, at the Lagos University Teaching Hospital (LUTH) to non-consanguineous Nigerian parents. The mother was a 32-year old graduate teacher gravida 4 para 3, one alive and father was a 41-year old self-employed lawyer. The first child, a female, had normal psychomotor development, but the next two children, both males, had obviously large heads at birth and died during the neonatal period.

Physical examination revealed a term male infant with a large head (Fig). The birthweight was 4400gms, supine length (crown-heel), 50cm and occipito-frontal head circumference, 53cm. Both the birthweight and occipito-frontal head circumference were above the 97<sup>th</sup> centile, while supine length was appropriate for the gestational age. The head transilluminated brilliantly and had inverted triangular appearance; the anterior fontanelle was wide and tense while the sutures were widely separated. There was generalised hypertonia with exaggerated tendon reflexes and bilateral adduction deformity of the thumbs was present (Fig). Pallor, jaundice, petechial haemorrhage, and hepatosplenomegaly were absent. There was no urinary nor faecal incontinence. The spine was normal and radiograph showed no abnormality of the vertebral bones. Skull X-ray film showed widely separated sutures with no intracranial calcification. Serological tests for toxoplasmosis, mumps, cytomegalovirus and syphilis were negative. Haematological profile was within normal limits. Air ventriculogram showed dilated ventricles due to apparent obstruction of the aqueduct. Needle aspiration of the ventricle was carried out, 1000ml of

ventricular fluid was obtained and analysis of the fluid showed no pleocytosis, protein was 70mg/dl and sugar was 110mg/dl. His general condition was considered too poor for shunting and he died at the age of 14 days. Parents refused autopsy.



Fig. Photograph of the infant with congenital hydrocephalus. Note the large head, hypertonia and adduction deformity of the thumbs (cortical thumb).

### Discussion

Congenital hydrocephalus occurs in approximately 0.2 per cent of all newborn infants when it is often associated with central nervous system malformations such as spina bifida, meningomyelocele, Arnold-Chiari malformation and Dandy-Walker syndrome.<sup>5,6</sup> Other known causes include chromosomal anomalies, genetic disorders such as the Bickers-Adams syndrome, and intrauterine infection.<sup>5,7</sup>

The physical features of hydrocephalus in a male infant with no obvious spinal abnormality, generalised hypertonia and 'cortical' thumb and a family history of previous male children with uncomplicated congenital hydrocephalus are consistent with the diagnosis of X-linked hydrocephalus in this infant. The infant had no dysmorphic features to suggest chromosomal anomaly as the cause of the hydrocephalus.

Clinical, serological and radiological evidence for intrauterine infections which are also important causes of congenital hydrocephalus were also lacking in the infant.

The clinical spectrum of X-linked hydrocephalus is variable; some infants are grossly hydrocephalic and die before or during delivery, while others live into adulthood with normal or slightly increased head circumference, moderate degree of mental retardation and spasticity.<sup>8</sup> In some families, male relatives on the maternal side, may be mentally retarded without any evidence of hydrocephalus thus suggesting limited expression of the gene.<sup>9</sup> On the other hand, the variability may suggest that the gene may be subject to considerable modification during development.<sup>10</sup> A diagnosis of X-linked hydrocephalus must be considered in all male infants with isolated hydrocephalus and since there is no difference between the aqueductal stenosis which occurs sporadically and that which is due to X-linked gene, analysis of the family history is of great importance. If there are affected brothers and/or male maternal relatives, the risk of recurrence is 25 per cent for each subsequent pregnancy and a 50 per cent risk that any subsequent male infant will be affected. The empiric recurrence risk of the sporadic cases has been estimated to be 0.5-1 per cent.<sup>10</sup> The prognosis of congenital hydrocephalus is poor; case fatality rate of 80 per cent has been reported, often in association with central nervous system and other systemic abnormalities, and amongst the survivors, the prognosis for normal intellectual outcome is also poor.

Until recently, the treatment of congenital hydrocephalus has been limited to postnatal cerebrospinal fluid diversion technique and shunting at this stage was often of little benefit. Recent advances in prenatal diagnosis and treatment have led to renewed interest in congenital hydrocephalus in an attempt to improve outcome by treatment *in utero*. Although prenatal shunting of foetal hydrocephalus is feasible, only 10 per cent of all cases of foetal hydrocephalus is uncomplicated; thus, the number of foetuses that would benefit from *in utero* shunting is low.<sup>12,13</sup> Moreover, experience thus far, seems to indicate that shunting may improve survival but with no clear-cut benefit to cerebral function. There is therefore, the need for the identification and counselling of affected families.

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